

REMARKS

Claims 16-35 are currently pending in the subject application. By the instant amendment, claims 1-15 are canceled without prejudice as being directed to a non-elected group. Applicants, of course, reserve the right to prosecute the subject matter of these claims in a divisional application. Further, claim 21 is amended to be in independent form, including all of the limitations of the base claim and any intervening claims. No new matter is added by the amendment to claim 21.

Applicants acknowledge with appreciation the Examiner's indication of allowable subject matter in claims 21-31, and the allowance of claims 32-35.

Claims 16-35 are presented to the Examiner for further prosecution on the merits.

In view of the foregoing amendments and following remarks, reconsideration and withdrawal of the rejections of this application are respectfully requested, and favorable action upon all pending claims is hereby requested.

A. Introduction

In the outstanding Office Action mailed May 21, 2003, the Examiner withdrew the previously indicated allowability of claim 20. The Examiner rejected claims 16, 17 and 20 under 35 U.S.C. § 103(a) as being obvious over United States Patent No. 6,177,307 B1 to Tu et al. ("the Tu et al. reference") in view of United States Patent No. 6,326,282 B1 to Park et al. ("the Park et al. reference") and United States Patent No. 5,879,459 B1 to Gadgil et al. ("the Gadgil et al. reference"). The Examiner rejected claims 18 and 19 under 35 U.S.C. § 103(a) as being unpatentable over the Tu et al. reference, the Park et al. reference and the Gadgil et al. reference,

and further in view of Wolf et al., *Silicon Processing for the VLSI Era: Vol. 1-Process Technology* ("the Wolf et al. reference"). The Examiner indicated that claims 32-35 are allowable, and that claims 21-31 are objected to as being dependent upon a rejected base claim, but indicated that claims 21-31 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

B. Asserted Rejection of Claims 16, 17 and 20 Under 35 U.S.C. § 103(a)

In the outstanding Office Action, the Examiner rejected claims 16, 17 and 20 under 35 U.S.C. § 103(a) as being obvious over the Tu et al. reference in view of the Park et al. reference and the Gadgil et al. reference.

This rejection is respectfully traversed. Applicants respectfully submit that the combination of references does not render claim 16 obvious.

In rejecting claims 16, 17 and 20, the Examiner stated:

Tu et al. disclose a method for fabricating a semiconductor device (see figs. 1A-1H and accompanying text). The method comprises: forming a trench 202, 204, 206, 208 in a semiconductor substrate 200 (fig. 1A), and forming a buried insulating layer filled in the trench without a void (fig. 1A and col. 2, lines 11-14).

Office Action of May 21, 2003, at p. 3.

It is respectfully submitted, however, that the Tu et al. reference does not teach or suggest forming a buried insulating layer filled in the trench without a void, as suggested by the Examiner, and as recited in claim 16 of the subject application. The Tu et al. reference merely states at col. 2, lines 11-14, that a plurality of shallow trench isolation (STI) regions 202, 204, 206 and 208 are provided in a semiconductor substrate 200. The Tu et al. reference includes no

further teaching regarding the STI regions, and completely omits any reference to a problem of void formation in a trench.

The Park et al. reference is directed to relieving stress in a trench that occurs due to a trench filling or an oxidation process. Specifically, the Park et al. reference teaches a trench isolation method that prevents oxidation of the interior walls of the trench, thereby relieving the aforementioned stress. The Park et al. reference does not address the problem of void formation in a buried insulating layer and does not teach forming a buried insulating layer filled in a trench without a void, as recited in claim 16 of the subject application.

Further, neither the Tu et al. reference nor the Park et al. reference teach forming a liner layer formed of a multi-layer of a silicon nitride layer and a silicon oxide layer on the sidewalls and bottom of the trench by atomic layer deposition (ALD), as recited in claim 16.

The Examiner relies on the Gadgil et al. reference for teaching ALD. The Gadgil et al. reference, however, also fails to address a problem of void formation in a buried insulating layer in a trench, and does not teach or suggest forming a buried insulating layer filled in a trench without a void, as recited in claim 16 of the subject application.

Therefore, it is respectfully submitted that the combination of references does not render the present invention, as presently recited in claim 16, obvious, and that claim 16 is therefore in condition for allowance.

Further, claims 17 and 20 depend from claim 16, and as such, claims 17 and 20 are believed to be allowable as depending from an allowable base claim.

Accordingly, reconsideration and withdrawal of the rejections of claims 16, 17 and 20 are respectfully requested.

C. Asserted Rejection of Claims 18 and 19 Under 35 U.S.C. § 103(a)

In the outstanding Office Action, the Examiner rejected claims 18 and 19 under 35 U.S.C. § 103(a) as being unpatentable over the Tu et al. reference, the Park et al. reference and the Gadgil et al. reference, and further in view of the Wolf et al. reference.

This rejection is respectfully traversed. Applicants respectfully submit that the combination of cited prior art references fail to teach all of the limitations of claims 18 and 19. Claims 18 and 19 depend from claim 16, which is believed to be patentably distinguished over the cited prior art references, as previously described. Therefore, because the Wolf et al. reference also fails to teach forming a buried insulating layer filled in a trench without a void, as recited in claim 16, claim 16 is believed to be patentably distinguished over the combination of prior art references, including the Wolf et al. reference.

Claims 18 and 19 depend from claim 16, and as such, claims 18 and 19 are believed to be similarly distinguished over the cited prior art references, and in condition for allowance. Accordingly, reconsideration and withdrawal of the rejection of claims 18 and 19 are respectfully requested.

D. Allowable Subject Matter

In the outstanding Office Action, the Examiner indicated that claims 32-35 are allowable, and objected to claims 21-31 as being dependent upon a rejected base claim. The Examiner indicated, however, that claims 21-31 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 21 has been amended to be in independent form including all of the limitations of the base claim, claim 16. Therefore, claim 21 is believed to be in condition for allowance, and a notice to such effect is respectfully requested.

Further, claims 22-31 depend, either directly or indirectly, from claim 21, and as such, claims 22-31 are believed to be similarly allowable as depending from an allowable base claim. Accordingly, a notice of allowance of claims 21-31, and of allowed claims 32-35, is respectfully requested.

E. Conclusion

Because the cited prior art references, alone or combined, do not anticipate or render obvious the present invention as claimed, it is respectfully submitted that the claims of this application are in condition for allowance, and a notice to such effect is respectfully requested.

If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.


In view of the foregoing amendments and remarks, reconsideration of this application is respectfully requested, and an early and favorable action upon all the claims is hereby requested.



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Respectfully submitted,

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DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, applicant hereby petitions the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

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